

Claims

1. A device for actuating a membrane (1) arranged in an opening to a space, wherein the membrane has a first surface (1') and a second opposite surface (1''), and is limited by an edge area (2) extending around the membrane, wherein the device (3) includes a first strip (5), which is adapted to be attached to the first surface (1') of the membrane (1) in the edge area (2), a second strip (6), which is adapted to be attached to a surface of a frame portion (7) extending around the opening, at least one exchanging member (8), which is provided between and connecting the first strip (5) and the second strip (6), and at least one actuating member (20) arranged to transfer a reciprocating primary movement to the exchanging member, which is arranged to convert the primary movement to a reciprocating secondary movement having a longer length of stroke than the primary movement and acting on the strips (5, 6) in such a way that at least one of the strips (5) moves towards and away from the other strip (6).
2. A device according to claim 1, wherein the primary movement extends along a primary axis (x) and the secondary movement extends along a secondary axis (z) forming an angle to the primary axis.
3. A device according to claim 2, wherein the exchanging member includes a rod (9), which extends between and substantially in parallel to the first strip (5) and the second strip (6), a plurality of inclined first link elements (10), which extend between the rod (9) and the first strip (5), and a plurality of inclined second link elements (11), which extend between the rod (9) and the second strip (6).
4. A device according to claim 3, wherein the activating member (20) is arranged to transfer the primary movement to the rod (9) in such a way that it reciprocates in its longitudinal direction and substantially in parallel with the primary axis (x), wherein the strips

will move towards and away from each other substantially in parallel with the secondary axis (z).

- 5 5. A device according to any one of claims 3 and 4, wherein the first link elements (10) extend substantially in parallel to each other and wherein the second link elements (11) extend substantially in parallel with each other.
- 10 6. A device according to any one of claims 3 to 5, wherein each link element (10, 11) has a first end, which is articulately connected to the rod (9) in a flexible first joint (12), and a second end, which is articulately connected to the respective strip (5, 6) in a flexible second joint (13).
- 15 7. A device according to claim 6, wherein each link element (10,11) is relatively rigid between the first end and the second end.
- 20 8. A device according to anyone of claims 3 to 7, wherein each link element (10, 11) extends from the respective strip (5, 6) towards the rod (9) and towards the actuating member (20) in such a way that the first and second link elements (10, 11) form an arrow-like configuration pointing towards the actuating member (20).
- 25 9. A device according to claim 8, including a first actuating member (20) and a first exchanging member (8), and a second actuating member (20) and a second exchanging member (8), wherein the first exchanging member (8) is provided in the proximity of the second exchanging member (8) in such a way that the two
- 30 exchanging members (8) point away from each other towards the respective actuating member (20).
- 35 10. A device according to any one of claims 2 to 9, wherein said angle between the primary axis (x) and the secondary axis (z) is substantially perpendicular.

11. A device according to any one of the preceding claims, wherein the actuating member (20) is provided between the first strip (5) and the second strip (6).
- 5 12. A device according to any one of the preceding claims, wherein the actuating member (20) includes a piezoelectric element (21).
- 10 13. A device according to any one of the preceding claims, wherein the membrane (32) has a somewhat curved shape.
14. A device according to any one of the preceding claims, wherein the device (3) is arranged to create a secondary sound field in said space (31) and includes a control unit (33), which is
15 connected to the actuating member (20) for controlling the primary movement of the actuating member.
15. A device according to claim 14, wherein the device (3) is arranged to reduce a primary sound field in said space (31) by
20 means of the secondary sound field and wherein the device (3) includes at least one sensor (34), which senses the primary sound field and is connected to the control unit (33).
16. A device according to any one of the preceding claims,
25 wherein said space forms the passenger compartment (31) in a vehicle (30).
17. A device according to claim 16, wherein the membrane is one of a front shield and a rear window (32) of the vehicle.
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18. A vehicle including a device (3) for actuating a membrane arranged in an opening of the vehicle (30), wherein the membrane has a first surface (1') and a second opposite surface (1''), and is limited by an edge area (2) extending around the membrane (32),
35 wherein the device (3) includes a first strip (5), which is adapted to be attached to the first surface of the membrane in the edge area,

a second strip (6), which is adapted to be attached to a surface of a frame portion extending around the opening,
at least one exchanging member (8), which is arranged between and connecting the first strip (5) with the second strip (6), and
5 at least one actuating member (20) arranged to transfer a reciprocating primary movement to the exchanging member (8), which is arranged to convert the primary movement to a reciprocating secondary movement having a longer length of stroke than the primary movement and acting on the strips (5-6) in such a
10 way that they move towards and away from each other.

19. A vehicle according to claim 18, wherein the device (3) includes at least one of the features in claims 1 to 17.